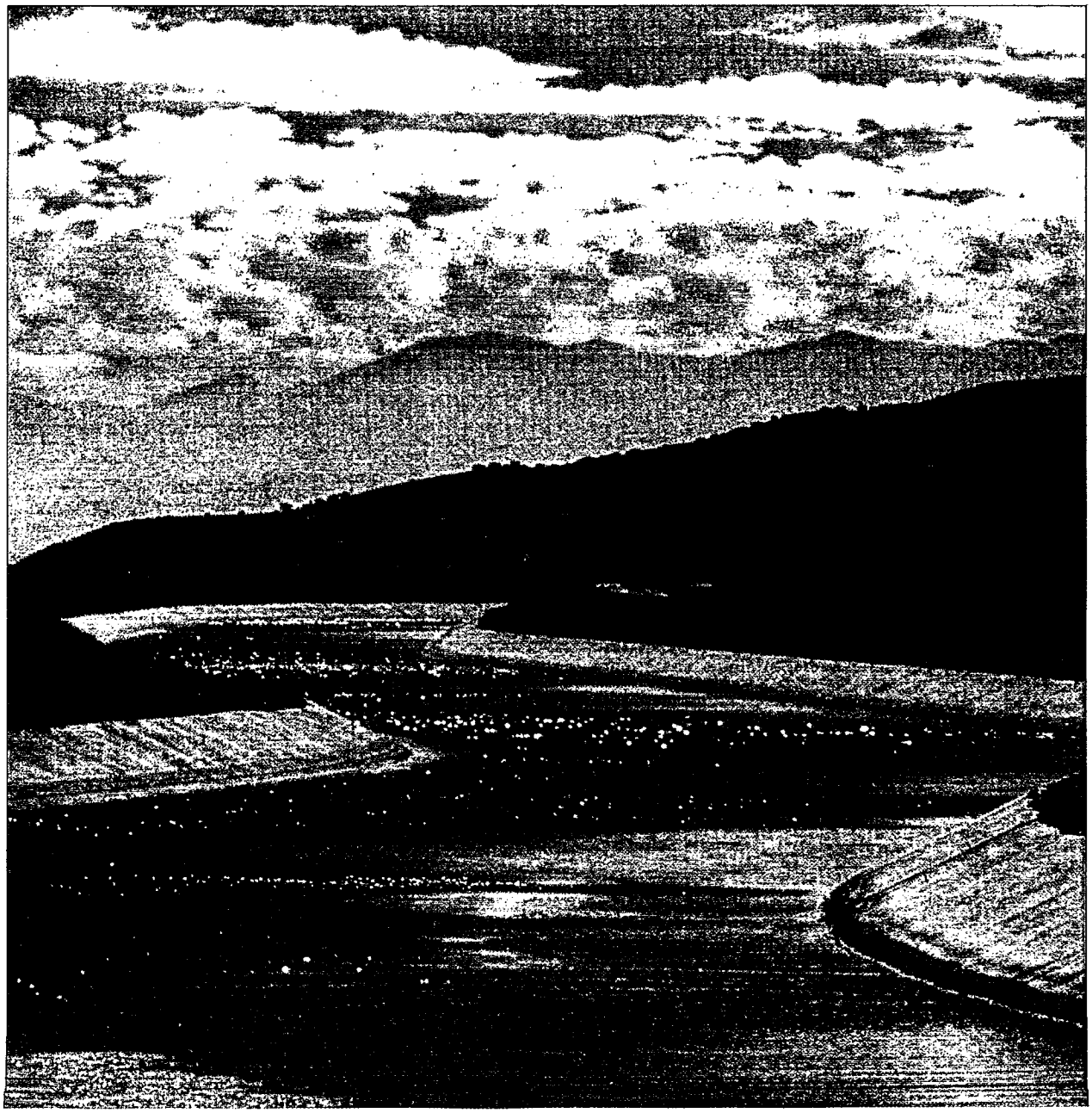
LAYPERSON'S GUIDE TO

Water Marketing & Transfers

Prepared by the Water Education Foundation



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The *Layperson's Guide to Water Marketing & Transfers* is prepared and distributed by the Water Education Foundation as a public information tool. It is part of a series of guides which explore pertinent water issues in an objective, easy-to-understand manner.

The mission of the Water Education Foundation, an impartial, nonprofit organization, is to develop and implement education programs leading to a broader understanding of water issues and to the resolution of water problems. For more information, contact:

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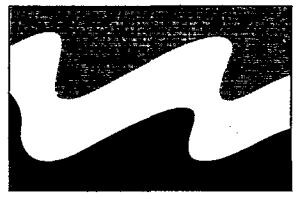

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On the Cover:

Water marketing — the transfer, lease or sale of water or water rights — is one tool to help meet California's increasing demand for more water. State law requires water agencies to make available a portion of the unused capacity of their canals and pipelines to facilitate transfers. On the cover is a view of the California Aqueduct, part of the complex water storage and distribution system developed to alleviate disparity between the state's water supply and demand.

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Introduction

Water is California's lifeline. This precious resource has been the basis for development of the arid West and continues to shape, contour and color the Golden State. Since the days of the Gold Rush, there have been bitter struggles over the distribution of water and use of available supply.

Allocation of water has been fraught with controversy in part because the northern part of the state is the source of approximately two-thirds of the available supply while more than two-thirds of the demand occurs in semi-arid central and southern California.

To alleviate the disparity between supply and demand, the federal and state governments built a complex water storage and distribution system.

Much of the state's annual runoff flows into the Sacramento and San Joaquin rivers, which run through the Central Valley and meet in the **Sacramento-San Joaquin Delta**.

To alleviate the disparity between supply and demand, the federal and state governments built a complex water storage and distribution system. The combined projects transport surface water from northern California to the Delta. Water is then pumped from the Delta and transported up to distances of hundreds of miles. The federal **Central Valley Project** (CVP) delivers about 7 million acre-feet of water in a normal year — about 20 percent of the state's total developed water. Approximately 95 percent of CVP water is used for irrigation, principally in the Central Valley, and 5 percent for urban use. The State Water Project (SWP) delivers about 2.8 million acre-feet of water in an average year, with 70 percent allocated to residential, municipal and industrial use and 30 percent to agricultural purposes.

Southern California also receives 4.4 million acre-feet a year from the **Colorado River**. In addition, the city of Los Angeles receives water from the Owens Valley via its own **Los Angeles Aqueduct**. As with many other water systems, these projects transfer water from one place to another.

In spite of the state's vast and complex distribution systems, meeting California's water demand continues to be problematic because of cycles of drought and flooding, and growth. According to the 1990 census, the population was 30 million and the state currently is growing at a rate of 400,000 people per year. At the same time, the traditional source of new water supplies — construction of dams and reservoirs — has been significantly curtailed because of high costs, lack of support for public funding, and environmental concerns. Recent laws and court decisions also have redirected more water to the environment for its protection and restoration.

One of the newer tools available to help meet demand is **water marketing**. Water marketing is the transfer, lease or sale of water or water rights from one user to another. It also may involve a sale of land to which the water is attached. Most exchanges involve a transfer of the resource and not a transfer of the water right. Water can be and has been traded between agricultural interests, who receive about 80 percent of the state's developed water, and from agricultural to urban users.

Transferring water, in particular from farms to cities, has been an emotionally charged issue because whoever controls a region's water also controls its destiny. Those opposed to major rural to urban water transfers frequently refer to the Owens Valley as a source of their fears. The first and most-legendary large-scale transfer in the West occurred in this eastern Sierra Nevada valley where, in the early 1900s, the city of Los Angeles purchased thousands of acres of land solely for the purpose of exporting the water.

The advantage of water marketing is that it allows a shift in water supplies without the cost of building new dams and reservoirs. It also can increase the seller's financial return. Transferring water from farms to cities is justified by some because the value of water used for urban needs is generally much higher than the dollar value of irrigation water. Water marketing also could result in water being applied to higher dollar value crops. Presently, most of the water used in agriculture is used to grow relatively low dollar value field crops, such as cotton, irrigated

pasture, alfalfa and rice, while most of the dollar value comes from producing fruits, nuts and vegetables. Another possible economic benefit of water marketing is that farmers who sell water may use a portion of the additional income to invest in irrigation and water conservation technology.

Transfers of water can, however, adversely impact local agricultural communities — including loss of income to local businesses and job losses for farm workers — when farmers sell their water and do not plant their fields. If a farmer upstream sells his surface water, the return flow available to downstream users may be reduced. Growers who sell surface water and replace it with ground water may increase pumping costs for other ground water users or aggravate overdraft problems in a ground water basin. Environmental concerns include potential adverse effects from transfers that alter the timing and amount of instream flows.

Resistance to water marketing stems largely from institutional barriers that include the maze of public agencies and regulations that developed around water supply and fears of unrestrained transfers and loss of water rights. Water marketing also is complicated by the fact that no two water use or **usufructuary** rights are alike, and standard marketing requires definite and certain rights. Water use rights can be riparian or appropriative and vary in quantity, use, and season of diversion.

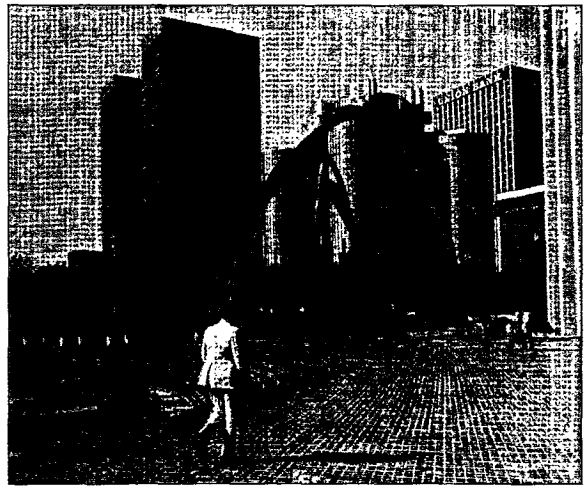
Water transfers on a short term basis — for one year or less — have been fairly common among farmers in the same irrigation service area. Such transfers do not require a water rights review. Since the late 1980s, there have been a number of **innovative transfer agreements** between agricultural purveyors and urban water districts. The largest ag-urban agreement is between Imperial Irrigation District (IID) and the Metropolitan Water District of Southern California (MWD). MWD agreed to fund conservation measures in the Imperial Valley in exchange for water from the Colorado River.

Although transfer activity, primarily intrabasin, began in the late 1970s, it wasn't until the early 1990s that transfers came to the front of the state's water policy. At the beginning of 1991, precipitation in California was less than 30 percent of normal and reservoirs were just above 30 percent of capacity. Water deliveries in some agricultural and urban areas were significantly reduced. In response, Gov. Pete Wilson directed the **Department of Water Resources** (DWR) to implement an emergency **Drought Water Bank** to buy water from willing sellers (mostly agricultural) for transfer to water deficient urban and agriculture regions on a short-term basis.

The success of the drought water bank removed any doubt that water marketing is part of an evolving era of water management in the state. Transfers — within the same basin and from one basin to another — will likely continue to be one of several methods used to meet future water needs. Although there is general agreement that voluntary transfers should be used to alleviate water shortages, the devil lies in the details.

Because of the unique nature of water, the interdependence of many users, and the traditional use of the resource, there is disagreement over what the proper mechanism to facilitate transfers should be, what parameters are necessary, and how large a role transfers should play. Should water be treated as a commodity and sold in a free market to the highest bidder? Or should it be treated as a natural resource and sold and transferred in a regulated market to protect interests not party to the transaction? Will long-term transfers, not simply one-year transfers, be allowed to occur?

Another crucial issue that must be resolved involves the Sacramento-San Joaquin Delta where water quality and environmental problems are complex. Much of the water that could be transferred is north of the Delta and much of the demand is south of the Delta. It generally is agreed that the Delta delivery system will have to be improved to facilitate transfers through the area and protect the ecosystem. There is, however, lack of consensus over the means of upgrading the distribution network.



Transferring water from farms to cities is justified by some because the value of water used for urban needs is generally higher than the dollar value of irrigation water.

This Layperson's Guide, part of a continuing series published by the Water Education Foundation, is intended to give the reader basic information on water marketing and transfers in California. More in depth information on many topics addressed in this guide can be found in other Layperson's Guides. Topics covered include water rights, ground water, water conservation, water recycling and reuse, the Delta, San Francisco Bay and the Colorado River.

Background

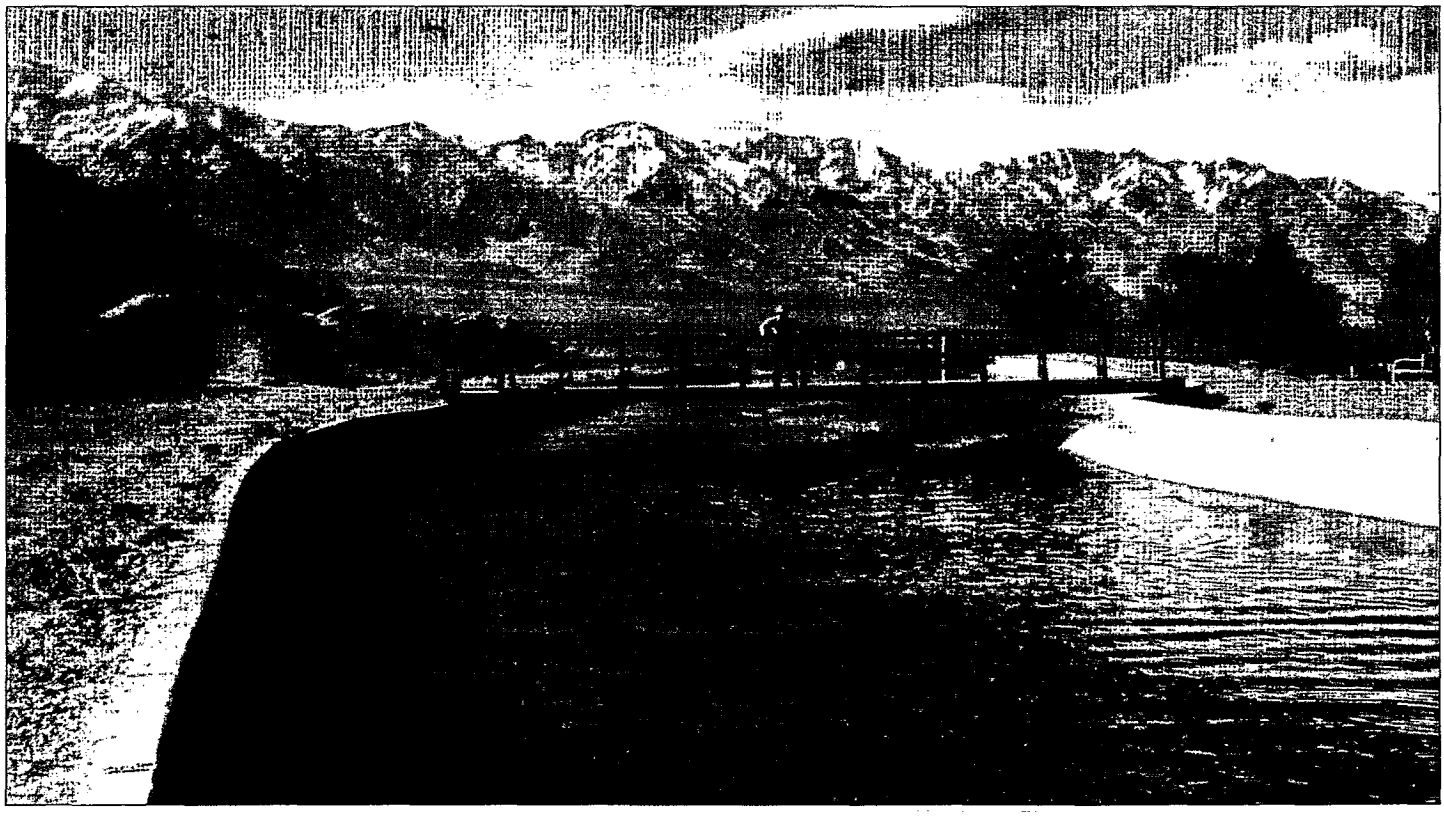
Below, a view of the Los Angeles Aqueduct in Owens Valley. The most bitter battle in the state's water wars – and one that has affected the development of water marketing – was over the transfer of water from the Owens Valley to the city of Los Angeles.

Transferring water from one region to another, particularly from agricultural to urban uses, is perceived by some as "robbing Peter to pay Paul." The most bitter battle in the state's water wars — and one that has affected the development of water marketing — was over the transfer of water from the **Owens Valley** to the city of Los Angeles. In the early 1900s, the Los Angeles Department of Water and Power (LADWP) purchased thousands of acres in Inyo County in the eastern Sierra Nevada valley solely for the purpose of exporting water. The city built two huge aqueducts, one in 1913 and another in 1970. The construction of the first aqueduct pitted neighbor against neighbor, and saboteurs dynamited the aqueduct. When the aqueduct was completed, it transported surface water from Owens Valley to Los Angeles. The second aqueduct exported both surface and ground water and included diversions from the streams that flow into **Mono Lake**, a separate basin north of Owens Valley.

From 1970 through 1989, more than 470,000 acre-feet of water were exported annually, which supplied as much as 75 percent of the city's supply. Following the buy up of the valley's surface and ground water to supply Los Angeles' booming population 250 miles away, Owens Valley agriculture nearly dried up. Today, Los Angeles owns about 85 percent of the Owens Valley and more than 300,000 acres in Inyo and Mono counties. In place of the once prevalent family farms are large stretches of open space and undeveloped rangeland, and the region's small towns are dependent on tourism and recreation.

Owens Valley residents sued LADWP in 1972 to stop increased ground water pumping until an environmental impact report (EIR), which assessed the effects of the second aqueduct's exports, was completed. The pumping caused many of the springs in the area to dry up, which in turn killed off the ground water-fed vegetation. In 1991, LADWP and Inyo County agreed to cooperatively manage the valley's water resources and develop a long-term water management plan to protect the ground water resources and riparian vegetation. Under the agreement, Los Angeles can continue to pump ground water as long as the ground water dependent vegetation is not adversely impacted.

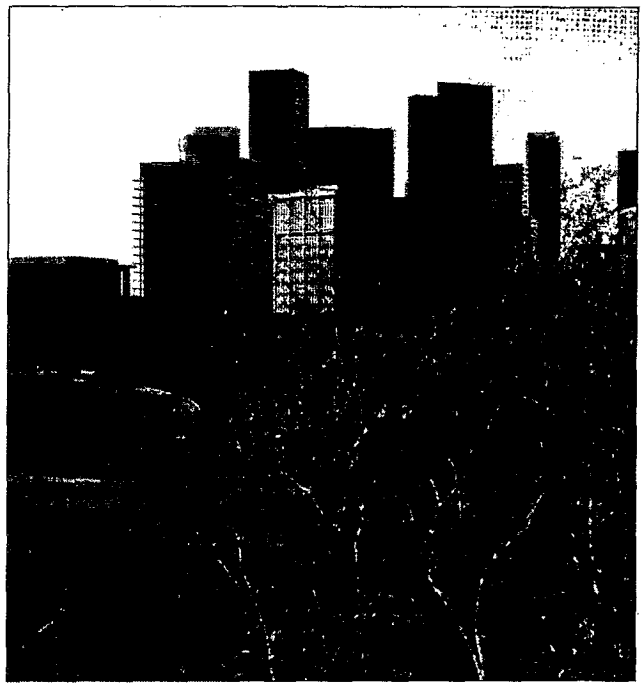
Water transfers have been discussed since the 1950s and interest in water marketing grew in the 1970s and 1980s. In 1977, then-Gov. Jerry Brown appointed a commission to conduct a comprehen-



sive review of the state's water rights laws. The Governor's Commission to Review California Water Rights Law made several recommendations in 1978 to the Legislature, including ones to encourage water marketing. However, few of the recommendations were adopted at that time. There also were a number of studies that encouraged the development of water transfers in California as part of a portfolio of strategies to meet increasing demand. Two of the earliest studies that cited the benefits of reallocating existing water supply by trade in place of building additional facilities were *Efficient Water Use in California: Water Rights, Water Districts and Water Transfers* (1978), a RAND report by Phelps, Moore and Graubaurd and *Managing Water Scarcity: An Evaluation of Interregional Transfers* (1984) by Vaux and Howitt of the University of California. The initial studies were met with heavy criticism, in particular from water suppliers, and it was not until the 1987-1992 drought that water transfers came to the forefront.

The first time the federal government got involved in transfers was during the 1976-1977 drought. The U.S. **Bureau of Reclamation** (Bureau), which operates the CVP, established a water bank. It bought more than 47,000 acre-feet of water from several water suppliers to help alleviate severe shortages, paying on average $49 per acre-foot. The Bureau sold the water for an average of $50 an acre-foot to farmers with critical needs. Highest priority was given to growers of orchards and perennial crops without alternative sources of supply, and crops that support livestock.

The Bureau's purchase price was based on the amount of the seller's foregone production without allowing for "undue profit." One of the stickier issues regarding CVP water transfers has been who should profit from a sale of water — the wholesale price of CVP water ranged from $1.50 to $30.86 per acre-foot, according to a 1992 Congressional Research Service report. The CVP created a subsidy in the form of interest-free water and facilities for irrigation users based on their ability to pay, which was intended to help settle the West. Federal taxpayers financed nearly all construction costs, which are to be reimbursed by state and local agencies. Of the $3.4 billion price tag, $1.3 billion has been repaid.



The struggle to seek out additional water supplies to meet the ever increasing demands of the state's many highly populated cities will continue to drive water rights debates in the future.

Public Trust

The city of Los Angeles in 1940 began exporting water from the tributary creeks that feed into Mono Lake, an inland sea set amid volcanic craters. The flow from five of the fresh water creeks that run into the saline lake was diverted in accordance with permits granted by the predecessor to the State Water Resources Control Board (State Board), which regulates water rights and water quality.

After four decades of diversions, Mono Lake dropped more than 40 feet, doubling the lake's salinity concentration and threatening the basin's unique brine shrimp and gull populations. In 1979, the National Audubon Society and the Mono Lake Committee sued LADWP to protect Mono Lake. The case, *National Audubon v. Superior Court*, eventually reached the state Supreme Court, which ruled the State Board was authorized to reconsider and modify long standing water rights to protect the **public trust** — the public's rights to many natural resources including running water, the sea and its shore. After 15 years of legal battles, the State Board in 1994 amended Los Angeles' water rights permits and significantly restricted its right to divert water from the lake's tributaries until the water level rises.

Water Rights and Transfers

California's water rights laws are complex. Marketing proponents say they can hamper water transfers. Others contend they are safeguards to block inappropriate transfers. **Ownership** of water is separate from the **use** of the resource. Under state law, water is the public property of the people of the state. It also is considered a public resource that the state has a continuing duty to protect for the benefit of its people under the **public trust doctrine**, which has its roots in Roman Law and is merged with the state's water rights system. In contrast, the right to use water can be claimed by individuals and entities, which include water districts and the state and federal governments.

The vast majority of water rights are appropriative rights, which initially were developed by gold miners. Appropriative rights are unrelated to riparian land ownership and are based on the principle of "first in time, first in right."

The state Constitution requires that all claimants' use of water be **reasonable** and **beneficial**. "Beneficial" uses include irrigation, municipal, domestic, industrial, and recreational use, protection of fish, wildlife and their habitat, and aesthetic enjoyment. "Reasonable" use, on the other hand, is not as tangible because it depends on the particular circumstances of the case, which may change over time. Legal scholars have characterized water rights as "vague" and "fugitive" and ownership of the right as "qualified."

The state has a dual system of water use rights, riparian and appropriative. **Riparian rights** are based on ownership of land adjacent to a stream or river and account for about 10 percent of the rights to use surface water. Riparian rights are not lost if unused and generally are not quantified. In times of shortage, allocation is based on the reasonable needs of other riparians. When a riparian and an appropriator are involved, a court may quantify the riparian's right. Riparian rights are not transferable but riparian water can be transferred for environmental purposes and instream beneficial uses.

The vast majority of water rights are **appropriative rights**, which initially were developed by gold miners. Appropriative rights are unrelated to riparian land ownership and are based on the principle of "first in time, first in right." The first to claim and beneficially use a specific amount of water has a claim superior to subsequent appropriators. The appropriator's right depends on continued use and can be lost if not used. Appropriations made after 1914 fall under the authority of the State Waters Resources Control Board (State Board). (Water appropriated prior to 1914 generally is exempt from State Board regulation.) The board's permits regularly contain binding terms and conditions to protect other water rights holders and the public interest. A permit can be revoked if its conditions are violated.

Both pre-1914 and post-1914 appropriators may transfer water but only after the State Board concludes that other water users will not be adversely impacted or the action will not unreasonably affect fish, wildlife, or other instream beneficial uses. This is because the priority of an appropriator's right is determined by when a permit was filed, and a senior appropriator's return flow often is critical to the junior appropriator. Any changes in a post-1914 appropriator's use — including purpose of use, place of use, or point of diversion — must be approved by the State Board. Some appropriators were concerned that a transfer could jeopardize their water right and to ease their fears, legislation was passed in 1980 specifying that transfers are not considered a non-use or abandonment of the right.

Both the CVP and SWP are appropriative rights holders and permitees of the State Board. The two projects provide water service to a variety of users pursuant to water supply contracts. The end-user holds a contractual right to water service and not a water right. Users that receive CVP water under a water supply contract with the Bureau may transfer water without state approval within the project service area.

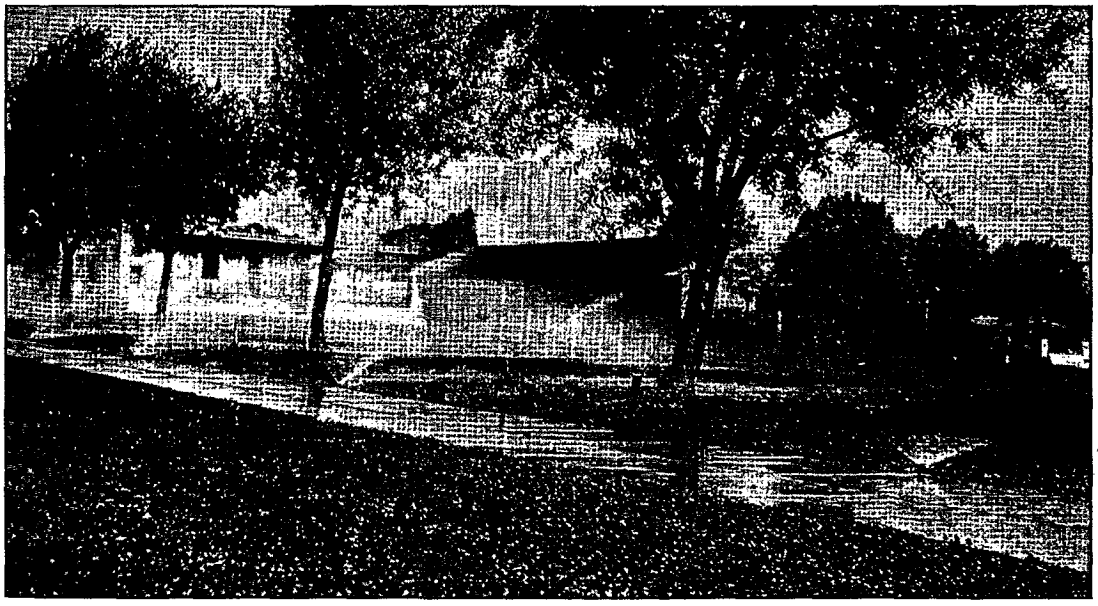
With the Owens Valley providing a painful reminder of an unrestrained interbasin transfer, **area of origin** statutes designed to protect counties where the water originates from the export of water outside the region were passed. The current patchwork of laws, however, is unclear as to the extent of statutory protection they provide. These laws may affect prospective transfers.

Public water districts are key players in water supply and the laws covering them are another element affecting water marketing. Local districts are authorized by law to transfer and sell water for use outside their service area and they have the ability to block out-of-district transfers. Some districts must make a finding that the water is surplus to the service area before they can transfer the water. There are about 1,000 local water districts, irrigation districts and water agencies, and they control a large percentage of the water resources, including most of the water supplied by the SWP and CVP. The water agencies purchase water from DWR or the Bureau and/or develop their own supply. Many local districts have resisted water marketing because of fears of loss of local control and decline in farming activity and farm-related employment. District officials also argue that water available for use elsewhere should first be offered to another user within the district.

As a result of district resistance, several state legislative proposals have been introduced to allow individual water users and buyers to negotiate a transfer without the district's consent, which usually holds the water right. These user-initiated transfer

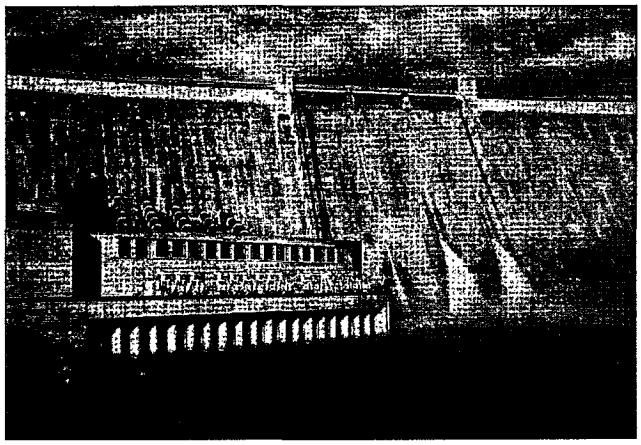
proposals have been defeated by vigorous opposition from some water districts and other interests.

In addition to water rights laws, water quality laws may also affect the transferability of water. The State Board has the authority to modify water rights permits to satisfy water quality standards and to protect public trust needs. A permit modification could reduce the amount of water allotted to the permittee and, subsequently, the amount of water available for transfer.



CVP Improvement Act

In addition to reallocating a portion of CVP supplies to the environment, the 1992 **CVP Improvement Act** also greatly advanced the concept of water marketing. Under the law, CVP water users are allowed to sell subsidized CVP water for a profit to any other entity, including ones outside the CVP service area — a practice previously prohibited. Transfers must be approved by the secretary of the Department of Interior and those that involve more than 20 percent of the CVP water under long-term contract also must be approved by the local irrigation district. Transfer of CVP surface water is prohibited if it would increase long-term adverse impacts on ground water supplies.



The 1992 CVP Improvement Act allows water users to sell CVP water for a profit to any other entity, including ones outside the CVP service area. Pictured above, Shasta Dam, keystone of the CVP.

One of the most contentious issues involving transfers of CVP water is who should approve transfers, particularly out-of-district transfers, the water agency or farmer. At issue is whether the water in question is perceived as a shared local resource controlled by the district or a resource belonging to the individual farmer. Supporters of local district control contend that the water agencies were formed to protect the interests of all and they should have a strong role in marketing decisions. Some economists believe that the best way to establish a market is to allow farmers to make decisions regarding buying and selling water.

The first long-term transfer proposal under the CVP Improvement Act was blocked by an irrigation district. The controversial agreement involved MWD and the Areias Dairy Farm in the San Joaquin Valley. Under the original marketing agreement, MWD would have paid $5.6 million to receive 32,000 acre-feet of water over a 15-year period. MWD also would have paid an additional $25 an acre-foot to the environmental restoration fund established by the CVP Improvement Act. The Central California Irrigation District, which supplies water to the Areias' land, opposed the sale because it believed that as holder of the contractual water right it should handle the water sale. The sold surface water would have been replaced by ground water and the local water agency and other users worried that the additional pumping would aggravate existing overdraft.

There also were concerns that the agreement would cause a wave of water transfers from the region to southern California. The Areias-MWD agreement is being restructured so that the district would be the transferring agent, a smaller quantity of water would be sold, and ground water pumping would not be increased. If the final agreement results in ground

Timeline

1859 California Supreme Court holds that appropriative rights are transferable in *McDonald v. Bear River and Auburn Water Mining Co.*

1862 California Supreme Court rules that the transfer of water or water rights cannot prejudice other water rights holders in *Butte T.M. Co. v. Morgan.*

1913 Los Angeles Department of Water and Power completes the first aqueduct that transports surface water from the Owens Valley to the city of Los Angeles.

1914 Water Commission Act becomes effective and appropriators are required to comply with the state centralized water use permit process.

1928 The California Constitution is amended to include language which requires all water uses to be reasonable and beneficial and prohibits waste and unreasonable use. (Article X, Section 2)

1931 The Feigenbaum Act adopted in 1927 is amended to provide protection of water resources in the counties of origin by restricting the state's appropriative authority.

1933 The Watershed Protection Act is passed prohibiting the state from operating in a manner that would deprive a county in which water originates of water needed for development (Water Code Section 11100).

1959 Delta Protection Act is adopted that declares it necessary to ensure adequate water supply in the Delta to maintain and expand agriculture, industry, urban and recreation development (Water Code Section 12200).

water being substituted for transferred surface water, the transfer will have to be reviewed by the Bureau to assess whether there will be any long term significant impacts on ground water conditions.

In 1995, the Central California Irrigation District submitted a transfer application to the Bureau on behalf of one of its water users, Redfern Ranches. It was the first long-term water transfer under the CVP Improvement Act to be approved by the Bureau. The ranch will fallow some of its land from 1995-1997 and transfer the water to three adjacent CVP districts in 1996 and 1997. The amount of water transferred depends on the number of acres fallowed, with each idled acre providing about 2 1/2 acre-feet of transferable water. The Bureau approved the transfer after determining that the transfer would not cause any significant environmental impacts.

Although the 1992 law advanced the idea of out-of-service-area transfers, critics say the law's red tape has hampered more routine transfers.

1970 Los Angeles completes second aqueduct that transports surface and ground water from Owens Valley and Mono Lake to Los Angeles.

1972 Owens Valley residents sue LADWP to halt increased ground water pumping from the valley.

1973 State legislation is passed that authorizes the State Board to grant approval of temporary diversion and use of water under urgent conditions (Water Code Sections 1425-1431).

1980 State legislation is passed declaring that it is state policy to facilitate water transfers and that the transfer of water or water rights shall not be considered waste or unreasonable use of water (Water Code Sections 109 (a) and 1244).

1982 State legislation is passed that requires DWR and other appropriate state agencies to encourage water transfers, including providing technical assistance (Water Code Section 109 (b)).

Legislation is passed authorizing local districts to transfer surplus water for use outside the district (Water Code Section 382).

1983 The California Supreme Court, in *National Audubon v. Superior Court*, rules that the public trust applies to Los Angeles' right to divert water from tributary creeks to Mono Lake, and that the state retains jurisdiction over these rights and may reconsider the impact on public trust resources.

1984 State legislation is passed to protect most of the state's major river systems from post-1985 appropriations that infringe upon the county of origin's water needs (Water Code Section 1215).

1986 State legislation is passed that requires DWR to establish a program to facilitate voluntary water transfers, which includes providing a list of entities interested in water transfers and consulting and coordinating its activities with other state agencies (Water Code Section 489).

Legislation is passed that requires DWR and local water agencies to make available a portion of the unused capacity of water conveyance facilities to water transferors (the Katz Bill, Water Code Sections 1810).

1991 LADWP and Inyo County agree to cooperatively manage the Owens Valley water resources.

Emergency legislation is passed to enable creation of DWR's Drought Water Bank by allowing "buy back" of supplies while protecting water rights. The legislation is made permanent in 1992, allowing the drought water bank to occur in any year necessary.

1992 The CVP Improvement Act is passed allowing users to sell CVP water for a profit to any other entity, including ones outside the CVP service area.

Legislation is passed to allow riparian water to be transferred for environmental purposes and instream beneficial uses.

1993 State legislation authorizes water suppliers to transfer surface and ground water outside the service area. Surface water transfers involving the substitution of ground water must be consistent with a ground water management plan or approved by the water supplier (Water Code Section 1745.04-1745.11).

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Types of Transfers

The source of water proposed for transfer will determine whether the transfer increases, reallocates, or decreases actual water supply. This depends upon whether the water at issue is "new water," "real water," or "paper water," which is far from easy to assess and an area of much controversy. These terms were generally defined by DWR in its 1993 report *Water Transfers in California: Translating Concept into Reality* to evaluate and discuss transfer proposals.

According to DWR, "**new water**" is transferable water that was not previously available and accessing it creates an increase in supply. Examples include water that was formerly not diverted but flowed to the ocean or water conserved from a reduction in agricultural drainage that would have been lost in a salt sink. "**Real water**" is water for transfer that is not derived at the expense of any other lawful user. Examples include net water available from not planting and irrigating a crop and water stored in a reservoir that would not have been released but for the transfer. Real water is not necessarily new water, but new water, by definition, must be real. "**Paper water**" is water proposed for transfer that does not create an increase in water supply. An example is the sale of water that the seller is legally entitled to use under a water service contract — a right that exists on paper — but one not historically used. Water that but for a transfer would have been return flow used by a downstream appropriator would be a sale of paper water because the water for the buyer is really coming from a user other than the seller.

There are several types of water transfers that stretch existing supplies. These include water transfers that are a result of fallowing land, changing crops, substituting ground water for transferred surface water, and releasing stored water. Water also can be made available through conservation practices. One of the most difficult issues is determining how much water should be available for transfer because the quantity of water actually consumed by a crop is generally less than the amount diverted. The amount of water consumed by a crop depends upon the crop, the site, and farming practices. The water not consumed eventually may return to a stream or river, percolate underground or be used on neighboring land.

A grower may decide not to plant his field — **fallow** his land — and sell the water to a willing buyer. Fallowing frees up water previously used for irrigation and allows it to be used in another area for agricultural or municipal and industrial supply. However, it is difficult to assess whether the proposed fallowed crop actually would have

been planted and whether the transfer would result in a reallocation of or a decrease in supply because a certain percentage of farmland is not planted in any given year for a variety of reasons. The quantity of water available for marketing from fallowing also is uncertain because the water proposed for transfer has likely been used in a variety of ways. For example, it may have irrigated various crops over the years that have different water needs. It also is a challenge to quantify the percentage of applied water that percolates into the soil to become ground water and the amount of water available for multi-year transfer agreements. A grower's water allotment is not fixed and may vary each year, and deliveries could be cut back because of drought and/or legislative or policy changes.

A transfer may be the result of a farmer selling surface water and irrigating instead with ground water, which is known as **ground water substitution.** Although surface and ground water are treated as separate resources, they can be hydrologically connected. This makes it difficult to determine how much of the transferable water is actually new water. If transferred surface water is replaced with ground water that is interconnected with a nearby stream, the surface supply could be diminished. In addition, replacement of surface water with ground water can lead to **overdraft** if there is excessive pumping of a ground water basin that is not replenished or recharged.

Ground water can be pumped directly into a stream river or canal and exported to another region. Direct diversions of ground water into surface water supply can pose the same problems as ground water substitution, however, there are some legal and regulatory limitations on out-of-basin ground water transfers.

Water transfers may involve water made available because of **crop shifting** — replacement of a water intensive crop with one that consumes less water. One example would be shifting from tomatoes to safflower, which uses less water. A prime benefit of crop shifting is that it provides an alternative to fallowing and its associated economic and social impacts on third parties.

Transfers may be derived from **conserved water.** These types of transfers can lead to an increase in supply when the marketable water is a result of a more efficient use of water, such as practices that reduce the amount of applied irrigation water. Transferring conserved water often is a less capital intensive method to increase supply in comparison with building dams and diversion facilities. More efficient water management that reduces applied irrigation and drainage outflow can stretch supply. However, not all conservation measures produce new water. The benefits of conserving water through the lining of irrigation canals are region specific. One example is the IID-MWD agreement where by MWD paid more than $200 million for IID conservation projects in exchange for the water salvaged, conserved water that would have principally ended up in a salt sink.

Conservation measures in the Sacramento Valley, on the other hand, may not create new water for export because much of the irrigated area overlies a usable ground water basin, and part of the drainage water supplies downstream users. Water that leaks from irrigation canals in the Sacramento Valley and much of the San Joaquin Valley provides usable ground water, feeds wetlands areas, and/or nourishes riparian vegetation.

Conservation measures in the Sacramento Valley may not create new water for export because much of the irrigated area overlies a usable ground water basin, and part of the drainage water supplies downstream users.

Transferable water also can be from surface flow that was **stored in a reservoir** and would not have been released if the transfer had not occurred. This would create a transfer of new water if the reservoir withdrawal is subsequently replaced by surplus water.

Drought Water Bank

The state's first foray into organized water marketing was the state Drought Water Bank established in 1991 under emergency conditions. At the beginning of the fifth year of the 1987-1992 drought, DWR bought more than 800,000 acre-feet of water for approximately $100 million from willing sellers in response to requests by water-short agencies. DWR bought water at $125 an acre-foot, which was based on estimates of what farmers would receive from growing relatively low-value crops plus an amount added as an incentive to sell water. The water came from a variety of sources, but because of time constraints, DWR did not secure prior commitments to purchase the water from those who said they needed it. Half the banked water came from growers who were paid to not irrigate their land. Approximately 170,000 acres were fallowed by both riparians and appropriators; and the riparian right holders were paid to leave the water they normally use in the stream or river. One-third of the water came from ground water substitution and the remaining amount was purchased storage water, bought primarily from Yuba County Water Agency.

At the beginning of 1991, precipitation in California was less than 30 percent of normal and reservoirs were just above 30 percent of capacity.

The banked water was sold for $175 an acre-foot (plus transportation costs) to agricultural and urban suppliers with critical needs. The sale price included DWR's purchase price, administrative costs, and allocating a portion of the water to satisfy Delta outflow requirements for through-Delta transfers. About 80 percent of the sales were to southern California and the San Francisco Bay Area.

DWR ended up selling slightly less than half the water purchased, partly because heavy rains in March reduced demand. Because more water was moved through the Delta, 165,000 acre-feet of the purchased water were used to meet water quality standards. The SWP purchased the remaining 265,000 acre-feet with the cost of carryover storage amounting to $45 million. In 1992, the stored water was delivered to SWP contractors.

DWR's water bank was considered a very effective regulated water market. According to a study, *A Retrospective on California's 1991 Emergency Drought Water Bank*, by Howitt, Moore and Smith of the economic consequences of the 1991 water bank, urban areas supplied with banked water received a $91 million benefit. The financial gains in agricultural regions that bought banked water were estimated to exceed losses in areas that sold water and fallowed land. Another report by RAND, *California's 1991 Drought Water Bank: Economic Impacts in the Selling Region,* found that growers who participated in the bank reduced their operating costs by more than 10 percent and increased their farm investments, which included purchases of irrigation efficiency equipment. The study also found that crop sales dropped 20 percent in the areas that sold water and that the overall loss of employment and income of third parties in local communities was minimal.

However, the third-party impacts were "excessively concentrated" in certain locations, in particular Solano and Yolo counties. Yolo County estimated that the third-party impacts from fallowing contracts with DWR increased unemployment and the county's social service costs by nearly $130,000. The county filed a claim against DWR but was not reimbursed for its costs because DWR officials questioned the validity of the link between the numbers of unemployed farm workers and fallowed land.

Another drawback of the bank was that all purchases of bank water were funded by beneficiaries of the water allocation. The riparian environment, which was in serious decline, was short changed, according to some environmentalists, because there were no direct water bank purchases made for its protection. Also, the fallowing of land used to grow

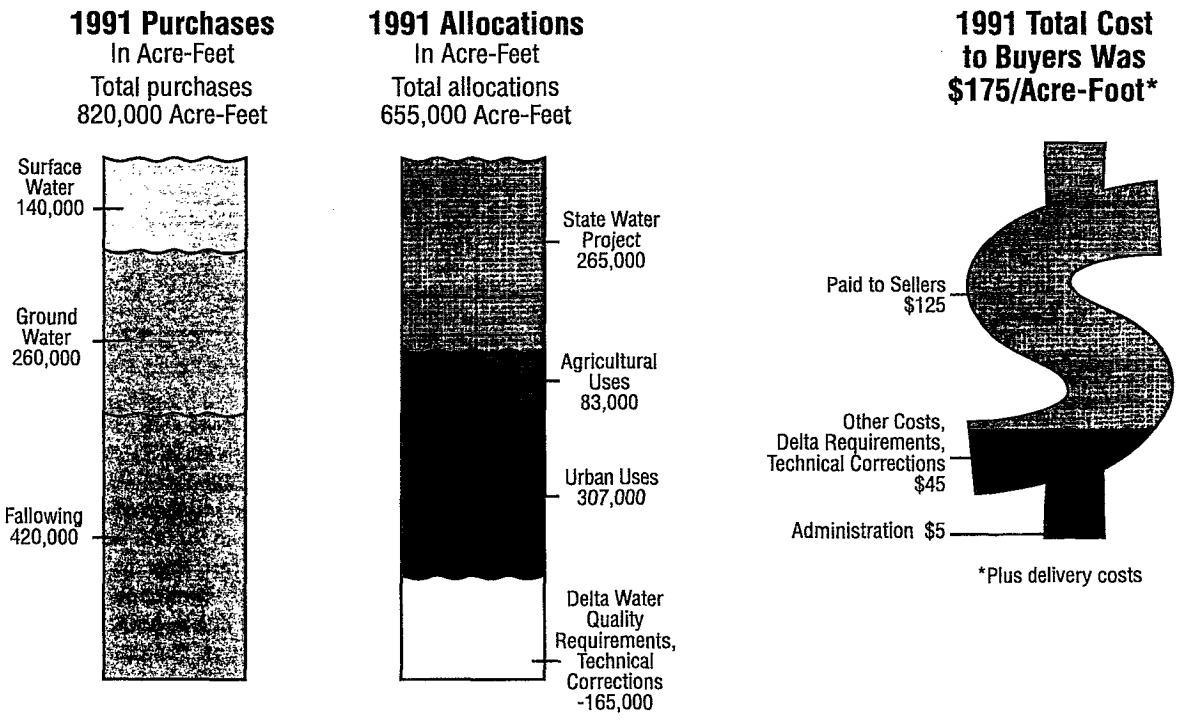
cereal and grain crops reduced food and habitat for waterfowl and wildlife. Legislation was passed in the latter half of 1991 to fund the purchase of 28,000 acre-feet of water for the California Department of Fish and Game (DFG) for instream flow releases and wildlife refuges in the San Joaquin Valley.

In 1992, DWR operated another drought water bank but on a much smaller scale because of increased precipitation and reduced demand. It purchased 193,000 acre-feet of water at $50 an acre-foot, which was primarily ground water exchange, and sold it for $72 an acre-foot plus transportation costs. Transferred water from fallowed land was not included. Unlike the 1991 bank, DWR bought water only after a willing buyer agreed in writing to purchase it. The water bank was reestablished in 1994 (purchasing 222,000 acre-feet) and formed as a precautionary measure in 1995, but was not put into effect in the latter year because of heavy precipitation.

DWR's water bank likely will be implemented in the event of future droughts and in anticipation, DWR prepared an EIR assessing potential environmental impacts. Several recommendations were made to avoid potential negative impacts of future water banks. These include:

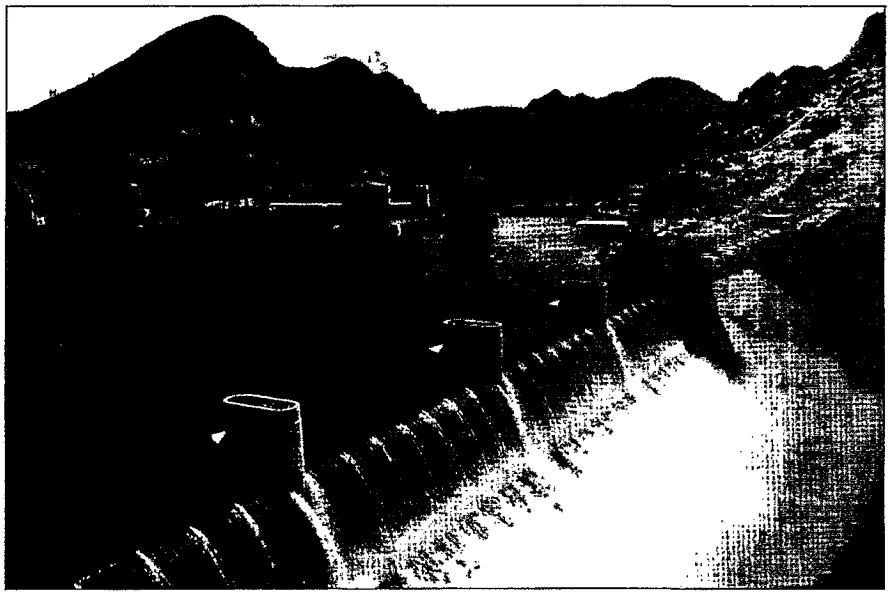
- Factoring in the effects on local communities and natural resources when making marketing decisions.
- Spreading water purchases over a larger geographical area to avoid concentrating fallowing in certain regions.
- Having a reliable mechanism in place to ensure that sufficient water is left instream for the protection of fish and wildlife — either through a direct purchase or tax on transferred water.
- Holding water that will be transferred through the Delta in upstream reservoirs and releasing it at designated times to maximize benefits to fisheries.

State Drought Water Bank



Other Transfers

Although the advantages and disadvantages of water marketing continue to be debated, large-scale transfer agreements have gone forward. The first innovative trading agreement — signed in 1989 after years of negotiations — was between IID, a productive agricultural region in the southeastern corner of the state that irrigates 500,000 acres with Colorado River water, and MWD, a wholesale supplier that serves a 5,200-square-mile urban area and 16 million customers in coastal southern California. MWD has searched for ways to maximize its dependable supply given its ever growing need and reduction — real and potential — of water available for import.



The Colorado River and its tributaries supply seven western states, Mexico, and dozens of American Indian tribes. Above, Lake Mead is formed by Hoover Dam.

The IID-MWD water deal involves the transfer of water salvaged from IID irrigation operations. This **ag-urban agreement** stemmed from charges of wasting water leveled against IID in the early 1980s that alleged IID's unregulated reservoirs and excessive deliveries to growers created wasteful amounts of return flow that ran to the Salton Sea, causing flooding. (The Salton Sea is a saline body of water fed principally by area agricultural drainage.) The waste claim pointed out the potential of this area as a source of additional water for urban use.

The State Board investigated the charges of IID's unreasonable water use and concluded that more than 400,000 acre-feet of water could be conserved annually. The State Board found that IID lacked adequate conservation measures and was in violation of the state constitutional requirement that all water use be reasonable and beneficial. In 1988, the State Board ordered IID to conserve a minimum of 100,000 acre-feet of water a year. Subsequently, MWD agreed to pay $200 million for conservation measures to improve IID's water distribution system; in return, IID agreed to reduce its diversions from the Colorado River in an equal amount to the water salvaged. MWD receives the conserved water — 100,000 acre-feet a year — for 35 years.

The agreement has been perceived as a major success, but a study by the Bureau, *Water Use Assessment of the Imperial Irrigation District,* released in 1995 revealed that IID's diversions from the Colorado River had increased between 1991 and 1994. The main reason cited was a decrease in irrigation efficiencies, which has led to increased agricultural drainage. The report recommended improving on-farm irrigation practices to reduce diversions from the Colorado River. IID officials say the study was flawed and have asked the Bureau to work with them on issuing a new report.

In 1992, MWD reached another ag-urban transfer agreement with growers in the Palo Verde Irrigation District (PVID), a 40-mile-long agricultural region located in the southeastern edge of the state near the Colorado River. More than 60 water rights holders in the PVID agreed to not irrigate for two years. These farmers received $630 for each acre fallowed. Approximately 20,000 acres were fallowed between 1992 and 1994 and MWD paid a total of $25 million to receive more than 90,000 acre-feet of water per year. This was the first **fallowing program** along the Colorado River and was considered an overall success, although there were adverse impacts to third parties. The state's general economic downturn, however, made it difficult to clearly distinguish the economic effects of the fallowing program.

Yuba County Water Agency

At the beginning of California's 1987-1992 drought, water-rich Yuba County Water Agency (YCWA) began a series of water transfers to DWR and later to local water agencies and cities. In 1991, favorable water conditions and a waiver from their contract obligations with Pacific Gas & Electric Co. concerning hydroelectric power generation allowed YCWA to transfer 99,000 acre-feet to DWR's Drought Water Bank and 28,000 acre-feet to DFG for instream uses and wildlife refuges.

The agency had long-standing commitments to deliver water to lands within its service boundaries, but no money to build delivery systems. For district officials, the motivation to sell water was to upgrade and fund new conveyance systems, begin long-needed water conservation programs, and flood enhancement projects. The agency made $33 million from water transfers between 1987 and 1992 and spent about $25 million on projects.

Special state legislation was needed for the transfers, and hearings were held before the State Board where objections to the transfers came from environmental groups. Environmentalists claimed diversions in the Yuba watershed reduced water to the Bay-Delta Estuary. YCWA was required to monitor the effects on the Bay and Delta for several years and minimal impacts were observed. Specific money gained from the transfer to the DFG went to fund a lower Yuba River fish enhancement project. The agency estimates that about 30 percent of the water above the transfer amount enhanced the environment.

New Bullard's Bar Reservoir, constructed and operated by Yuba County Water Agency.

Conjunctive Use

Conjunctive use of ground and surface water is being considered for water marketing plans. Under a conjunctive use program, surface water is relied upon for irrigation, urban use, and to recharge ground water basins in wet years. The excess water is stored or "banked" in underground aquifers so that it is available when surface supplies are low. In some ways, conjunctive use is a long-term, carefully planned ground water substitution program.

Storing water underground has several advantages over surface water storage. It is far less damaging to the environment than the construction of reservoirs and dams, and usually does not require an extensive distribution system. Water banked underground also has a lower evaporation rate.

Surface water also can be substituted for ground water through "in lieu" techniques in areas that historically have relied either solely on ground water or on a combination of ground and surface water.

There are many examples of conjunctive use in California. However, according to a 1995 analysis by the Natural Heritage Institute (NHI), California has never sought to realize the full potential of conjunctive use because of the state's emphasis on surface water development and because of the difficulties caused by state laws and institutions.

The NHI study advocates exploring the potential of using large ground water basins to store water to increase the state's surface water supply. The water would be captured for environmental, municipal and agricultural use through a voluntary state level conjunctive use program. In the NHI exploratory study, a model was used to discover that a ground water storage and retrieval system operating in the Central Valley could yield approximately 1 million acre-feet of water in an average year. Like other marketing examples, NHI believes urban water supply agencies are likely to be the partner most able to absorb costs of a voluntary conjunctive use program in exchange for water supply benefits.

Conjunctive use programs are being implemented by some local water districts, including the Kern Water Bank and Semitropic Water Storage District.

E-027257

New Proposals

The San Diego County Water Authority (SDCWA) and IID began negotiating a transfer deal in 1995 similar to the MWD-IID transfer agreement. San Diego would receive water conserved from the Imperial Valley and the amount of water salvaged and transferred was estimated by IID to be more than 400,000 acre-feet annually. The price of the water and duration of the transfer have not been settled, although a "market price" has been suggested.

There are several points being debated by officials. One concern is that if San Diego receives water directly from IID, what effect would this have on MWD's operations and capital improvement program? SDCWA is MWD's biggest customer. SDCWA officials say they plan to use both MWD water and the IID water, that the new supply from the Imperial Valley would supply future demands. Another issue is how the water would get to San Diego. If the transferred water was transported by MWD's Colorado River Aqueduct, SDCWA would have to pay the costs of "wheeling" — moving — that water. Agreeing on wheeling costs is a major bone of contention between San Diego and MWD. MWD originally proposed charging $285 an acre-foot, which would have resulted in the IID-San Diego transfer water costing more than its MWD supply.

San Diego also is looking into constructing its own conveyance facility to transport water from the Imperial Valley to its door step — approximately 100 miles. SDCWA would be the initial buyer and could facilitate future transfers for other water agencies and Mexico.

In late 1995, MWD and the Southern Nevada Water Authority announced a proposal to jointly finance costs to line the All-American Canal near the Imperial Valley (which actually would require construction of a new facility) and share the water conserved. The proposal — California's first interstate transfer agreement — raised questions of whether an individual water district or state officials should have say-so over sharing water with another state.

Elsewhere in 1995, two counties faced the prospect of out-of-county transfers. Placer County, a water rich county in northern California, is considering selling a portion of its water to a Sacramento water agency. Placer County Water Agency (PCWA) may sell up to 29,000 acre-feet of water a year to Northridge Water District (NWD) in Sacramento County with two provisions that allow PCWA to stop the transfer if and when the water is needed in its service area. The transfer of this surface water supply will allow NWD to reduce its ground water pumping, thereby benefiting the ground water basin in both counties.

In Yolo County, a local rancher considered selling his appropriative rights of 2,000 to 3,000 acre-feet of water a year to Solano County. The proposed transfer would have been a permanent out-of-county transfer. Yolo County was not part of the negotiations and officials feared that the sale would jeopardize the total amount of water in the county.

Colorado River

The Colorado River and its tributaries supply seven western states, Mexico, and dozens of American Indian tribes. The 1,400-mile-long river is one of the most heavily regulated rivers in the world. Battles over allocation of its water span nearly a century and have been extremely complicated. Dividing the river's water has involved interstate compacts, a U.S. Supreme Court decision, a treaty with Mexico and federal and state legislation. On the lower Colorado River, the secretary of the Interior acts as water master and administers the water. For this reason, the federal government would hold the ultimate authority over water transfer proposals.

The Colorado's flow — a long-term annual average 15 million acre-feet — is divided between what have been designated as the upper basin states — New Mexico, Colorado, Utah and Wyoming — and the lower basin states — Nevada, Arizona and California. The latter two states in particular have fought bitterly over water supply. Following a 1963 U.S Supreme Court decision in *Arizona v. California*, California's basic apportionment was fixed at 4.4 million acre-feet instead of the 5.3 million acre-feet California believed it had. Since that time, southern California has been able to use as much as 5.3 million acre-feet a year because Arizona and Nevada have not used their full entitlements. The state eventually could lose the use of more than 600,000 acre-feet a year of Colorado River water — water MWD relies on for its 16 million customers.

E-027258

Ground Water

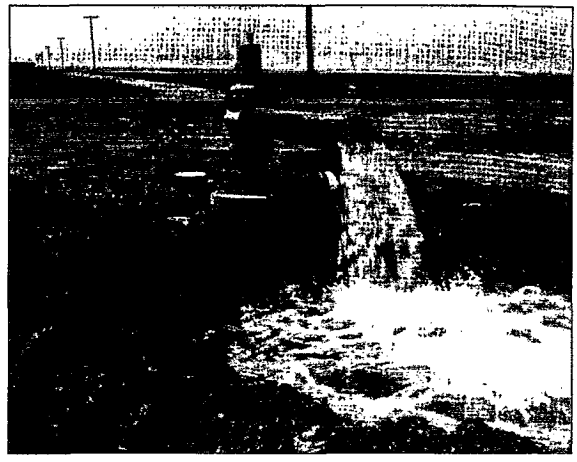
Ground water resources play a vital role in California and have and will continue to be an integral part of water transfers. Ground water provides about one-third of California's supply on average and as much as two-thirds in dry years. For the most part, ground water is inseparable from surface water resources. Precipitation soaks into the earth and becomes ground water or later resurfaces as a spring, river or spring-fed lake. It is estimated that as much as 30 percent of the state's surface water comes from ground water. Overlooking the interconnection of ground water and surface water could lead to an involuntary redistribution of surface water.

Transfers that involve ground water must take into account not only the physical difference of the resource but also a separate set of laws and judicial decisions that affect its use. In spite of the importance of ground water, its use in California is **generally unregulated.** There is no statewide comprehensive ground water management plan and percolating ground water, which is the bulk of the resource, is not regulated.

State law does require that the use of ground water be **reasonable.** Ground water can be appropriated like surface water but there is no permit process. There are general parameters that apply to property owners above a ground water aquifer. Property owners overlying an aquifer have a reciprocal right to a fair amount of the resource, or a "correlative" right. **Overlying rights** are analogous to riparian rights and not quantifiable unless the ground water basin has been adjudicated, which establishes the rights of the affected parties. The rights of landowners of overlying land are superior to ground water appropriator rights and only surplus water is available for appropriation by others under the first in time, first in right rule.

Transfers of ground water can threaten the integrity of a ground water basin. Excessive pumping and insufficient recharge will cause overdraft, which can lead to a range of problems including lower water tables, increased pumping costs, land subsidence and reduced water quality caused by contamination from intrusion of sea water and/or other sources.

The DWR drought water banks bought and sold surface water that was substituted with ground water. Ground water withdrawals in 1991 did raise concerns in two counties — Yolo and Butte. In Yolo County, the additional pumping aggravated existing overdraft and land subsidence. According to DWR, which monitored ground water pumping in three counties, the increased pumping did not cause significant adverse impacts. More than 100,000 acre-feet of the 1994 water bank supply came from surface water that was replaced with ground water in Butte County. A group of local farmers near the Western Canal Water District claimed the added pumping of the aquifer to replace the transferred surface water lowered water tables, which increased pumping costs and threatened local crops.



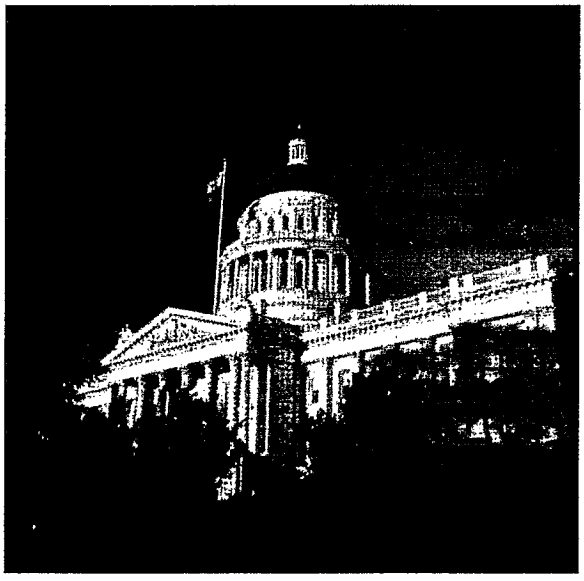
Although most of the state's 450 ground water basins are unregulated, more than a dozen basins in the state have undergone adjudication to control the rate of ground water extraction. State law allows surface water to be sold and replaced with ground water but requires pumping to be consistent with a ground water management plan if one is in place, or otherwise be approved by the local water district. In addition, transferors who sell surface water cannot replace it with ground water if the ground water substitution would cause or aggravate overdraft in a ground water basin.

Transfers that involve ground water must take into account not only the physical difference of the resource but also a separate set of laws and judicial decisions that affect its use.

To protect ground water in unregulated basins, legislation was passed in 1992 that allows water agencies to develop **ground water management plans.** The law, however, does not require the plans to include the entire county, ground water basin or watershed, and watersheds often cross political boundaries. In addition, cities within counties can adopt their own management plans, and many plans have faced formidable opposition because of fears of pumping restrictions and pump taxes.

County ordinances have been passed in a number of counties to protect local ground water from overdraft, particularly from out-of-county exports. A county's authority to regulate its ground water supplies was established in 1994 by an appellate court in *Baldwin v. Tehama County.* The case arose after two farmers, who owned land in Tehama County and wanted to export ground water to another county, sued Tehama County after it enacted an ordinance to protect ground water resources. The 1992 ordinance restricted new ground water wells and required permits for transfer of ground water outside the county. An appellate court ruled that counties have the authority to regulate ground water under their police powers.

Policy Issues



Since the 1980s, legislation has been enacted to encourage voluntary water transfers.

Interest in water marketing accelerated during the 1987-92 drought and in the process thrust many policy issues — from social to environmental — to the center of the water supply debate. Critical issues include what safeguards should be in place to protect third parties and the affected environment if water is traded as a cash crop? If mitigation measures are incorporated, what extent of protection would be provided and who would pay for them? As with every issue in water marketing, there are a wide range of views on the impacts of transfers.

A key concern is the effect on the economic base of rural farming communities with an increase in transfers of water from agriculture to urban areas — whether short-term or permanent, or through a free or regulated market. Farmers and others fear that urban water buy outs could lead to the idling of farmland, loss of jobs, lowering of ground water tables, increase in land speculators looking to buy up land and its water supply to resell to cities at a significant profit, and loss of a way of life. From the urban perspective, jobs created in the cities are much greater in total value than employment losses in farming communities caused by transfers, according to the Bay Area Economic Forum and MWD.

Although there are different opinions on the extent of third party impacts, the diverse interests agree that potential adverse consequences should be addressed. Various measures to mitigate third party impacts range from limiting the number of acres taken out of production, to restricting the amount of water transferred from an irrigation district, to placing a levy on transfers to reduce local governments' social costs, establishing a mitigation fund to settle damage claims, to compensating and retraining displaced farm workers.

Transfers of water can adversely affect wildlife habitat, riparian vegetation, wetlands and other areas of the **environment** in a variety of ways. If not properly conducted, transfers can alter the timing and volume of instream flows which are critical to the health of many fisheries. Some environmental groups view water marketing as a pragmatic way to reallocate supply to protect ailing fisheries. Growers' water could be bought and used for the benefit of the aquatic environment. Other environmentalists are concerned that long-term transfers from agriculture to urban centers could fuel suburban sprawl.

State and federal laws do provide general protection for the environment. California prohibits transfers that would unreasonably affect fish and wildlife, and the CVP Improvement Act prohibits transfers that would significantly reduce the quantity or quality of water necessary for instream uses and wildlife. Because of the limited protection of these laws, many concur that a mechanism for funding water transfers for environmental uses should be in place, such as a tax on transfers.

Transfers through the Delta must take into account state and federal water quality standards. The CVP and SWP are required to release water from their reservoirs to maintain Delta water quality and flow criteria. During DWR's 1991 drought water bank, approximately 160,000 acre-feet of water were used to meet water quality criteria in the Delta. A business-sponsored water marketing and finance project recommended that through-Delta transfers include carriage water in an amount that would vary depending on hydrological conditions and type of transfer. *A Delta Water Transfer Handbook* is now being prepared for the Authority for Environmental Analysis of Water Transfers to offer guidelines for temporary and long-term transfers through the Delta.

An increase in transfers will put greater pressure on the existing water distribution system which could increase the push for additional facilities, particularly in the Delta where an isolated facility to skirt the area (once referred to as the Peripheral Canal) has been proposed with various degrees of intensity for years. A key concern is who would pay for a new facility and what assurances would be in place to prevent damaging transfers from the northern part of the state to the south.

Using water transfers to alleviate supply disparity makes sense from an **economic standpoint** because building dams and reservoirs is so costly and environmentally damaging. Integrating water marketing into the state distribution scheme would facilitate a shift of water from agricultural regions, which use most of the developed water, to growing cities. According to some economists, reallocating 10 percent of the agricultural sector's water would meet the needs of urban centers for 25 years.

Open or Regulated Market?

A water market provides the opportunity for willing sellers and buyers to come togethe and negotiate a price. One of the thornier issues is whether water should be bought and sold in a "free" or regulated market. As one commentator noted, "the heart of the problem is whether economic theory alone should dictate the use of water resources."

Many argue that because of the nature of water and its myriad values, the resource cannot be treated as a commodity. Free market opponents point out that economic efficiency should not take precedent over other important values. For example, a dollar amount should not determine the fate of a species — the value of which is unknown. In addition, some environmentalists contend that the nonprofit sector's ability to compete in a free marketplace with private interests is overestimated.

The state likely will play a role in water marketing because at a minimum, it would need to coordinate use of its reservoirs and aqueducts. The Bureau also will be involved in water transfers to some extent because of its regulatory authority over the CVP and Colorado River. In addition, in order for there to be a "free market" in water transfers, many changes in law, regulations and water rights decisions would be required. Thus, the real debate is over the degree of governmental involvement.

A critical question is who should determine the price of marketed water and should farmers profit from selling the public's water. According to business interests, the market should determine the price paid for water and the quantity of water involved in a transaction. They also believe that farmers need a financial incentive to pursue water marketing.

Legislation Supporting Transfers

Since the 1980s, legislation has been enacted to encourage voluntary water transfers. State law specifies that transferors' water rights will not be impaired and that transfer of conserved water is a beneficial use of water. Short-term transfers can be approved by the State Board without conducting a public hearing if they will not harm other water users or have unreasonable impacts on fish and wildlife and other beneficial instream uses. The amount of water that can be transferred by post-1914 appropriators is the quantity that is consumptively used. The State Board may approve transfers that last longer than one year if they will not injure other water users or fish and wildlife, and after notice and an opportunity for a hearing have been provided.

Beginning in 1986, DWR was required to establish a program to facilitate transfers, which includes producing information about transfers, prospective transferors and usable conveyance facilities. DWR also is required to coordinate its activities with other agencies, including the Bureau. Under the coordinated operations agreement between the Bureau and DWR, the Bureau is able to use unused capacity in the SWP's California Aqueduct to deliver water to state and federal contractors. Under a 1986 act by Assemblymember Richard Katz, DWR and local water districts are required to make available to all public agencies 70 percent of the unused conveyance capacity for water transfers. The Katz bill requires that the transfer not injure other water users or fish and wildlife and that the transferor pay for use of the conveyance facilities.

In early 1996, a business-sponsored water marketing group released draft water transfer legislation, which, if enacted, would facilitate and streamline surface water transfers in the state. Among the proposals included in the *Model Transfer Act for California* are ones that would:

- Increase the legal protection of transferors that would apply throughout the entire transfer process
- Clarify the State Board's transfer review process and limit the time allowed for reviewing transfers
- Expedite the process for reviewing transfers of conserved and salvaged water.
- Clarify that water dedicated by water right holders for instream uses shall be in addition to legal requirements
- Allow local water district customers to transfer water they are entitled to but require that transfers be approved by the local agency
- Establish a fund to compensate injuries caused by expedited transfers of conserved wate
- Establish local water banks.

The Future

The 1991 Drought Water Bank was the state's first plunge into organized water marketing. DWR's Drought Water Bank was recognized in 1995 when the Ford Foundation and John F. Kennedy School of Government named it a finalist in its Innovations in American Government program. It demonstrated that flexibility exists to meet increased demand through a system of voluntary water transfers. But numerous unresolved issues need to be addressed. These include resolution of how to avoid potential harm to interests affected by water transfers — third-party and environmental — and agreement to the degree of market regulation and who should hold veto power over water transfers. There also is the issue of whether water transfers should be a short-term or permanent solution, or a combination of the two. It is difficult to assess the effect of permanent transfers because many of the impacts of short-term transfers — social, environmental and economic — are not comparable to the impacts of permanent transfers.

Water marketing has taken and will continue to take many forms and the various types and uses of transferred water can accommodate different needs if creatively structured, but it is not a cure-all. It is one of several methods to meet escalating demand. Other water supply options include water conservation measures by both the urban and agricultural sectors, desalination of sea water, recycling wastewater, and land retirement — taking agricultural lands out of production that have poor drainage and contain high levels of salt and selenium. Using a combination of these measures will put the state's most valuable resource to better use, ease the pressures of the population growth and enhance fish and wildlife habitat.

Developing a reasonable transfer system will be challenging but whatever strategies are pursued, the most effective ones have and will continue to involve cooperation and consensus.

GLOSSARY

Acre-foot - The amount of water that would cover an acre of land 1 foot deep (325,851 gallons). An acre-foot of water can support the annual indoor and outdoor needs of one to two urban households.

Aquifer - A geologic formation that stores, transmits and yields significant quantities of water to wells and springs.

Carriage water - The amount of extra water required for Delta outflow to maintain water quality standards in the Delta as the result of an increase in exports.

Conjunctive use - The planned use of ground water in conjunction with surface water in overall management to optimize water resources.

Desalination - Specific treatment processes to demineralize sea water or brackish (saline) water for reuse.

Developed water - Water that is managed, stored, diverted from rivers or otherwise developed for human use.

Ground water - Water stored underground in pore spaces between rocks and other alluvial materials and in fractures of hard rock occurring in the saturated zone.

Fallow - Cultivated land that lies idle during a growing season.

Interbasin transfers - Transfers of water from one basin to another.

Intrabasin transfers - Transfers of water within the same basin.

Overdraft - A condition that occurs in a ground water basin when pumping exceeds recharge over an extended period of time.

Return flow - Water that is applied to a crop but not consumptively used, which makes its way back to a waterway and is available for use by downstream users.

Saturated zone - The part of a water bearing layer of rock or soil in which all spaces, large or small, are filled with water.

Subsidence - The sinking of the land surface due to a number of factors, of which ground water extraction is one.

Third-party impacts - Direct and indirect economic, social or environmental effects of a water transfer to a party other than the seller or buyer.

Usufructuary - A right to use, rather than own, the property of another, such as the state's water.

Water table - The upper surface of the saturated zone that determines the water level in a well in an unconfined aquifer.

Wheeling - The transportation of water, as the result of ad hoc contracts or other arrangements, in conveyance facilities in which the transferring party does not otherwise have the authority to use.

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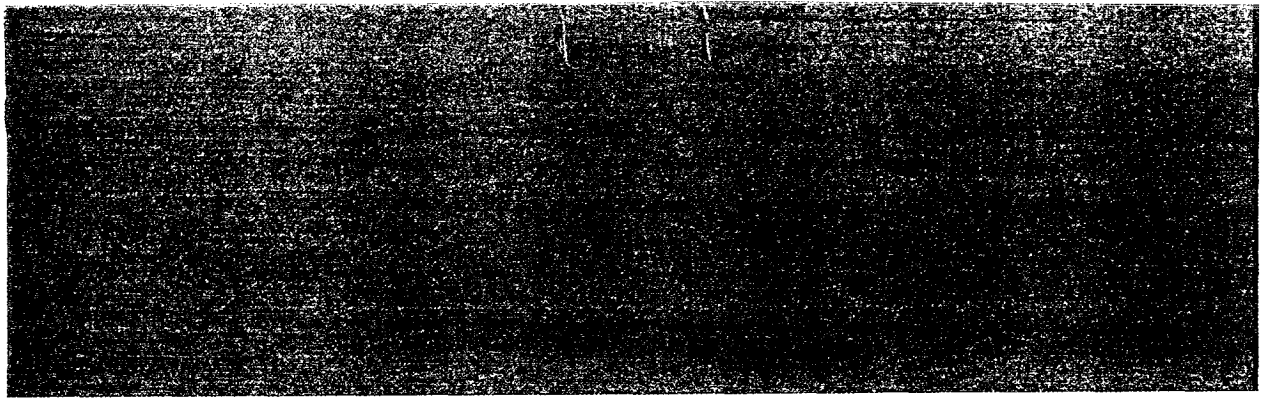

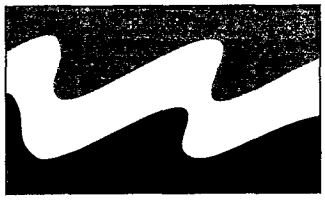

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